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1 20. BANK PROTECTION

Bank protection consists of a wide variety of individual techniques to directly armor or reinforce a bank, deflect flows away from a bank, decrease bank height, or increase soil strength of the bank material for the specific purpose of decreasing bank erosion. Banks form the lateral perimeters of natural streams, constructed channels, lakes, reservoirs, estuaries, and tidal areas.

Bank protection, as it relates to habitat restoration, is a subset of the entire realm of stabilization techniques. Bank erosion and lateral migration is a natural geomorphic process, although in many disturbed systems the erosion is occurring at an accelerated rate. Part of a restoration project may consist of bank protection activities if they are used in conjunction with a larger restoration approach, and if they do not preclude natural stream processes from occurring.

A full description of various streambank stabilization techniques is available in the Washington State's "Integrated Streambank Protection Guidelines".

1.1 Introduction

1.1.1 Description of Technique

Bank protection in itself is not a restoration technique. Protecting a streambank from accelerated erosion treats a symptom and generally does not address the underlying cause of the instability. The underlying cause of instability should be identified early in any restoration project. Bank protection may be used as a specific technique to restore a stream system if it is designed to restore natural functions using native materials that support a self-sustaining system. An example is the use of large wood to reinforce a streambank to provide temporary protection while native vegetation becomes established on the floodplain. Without this temporary protection, it can be very difficult to establish riparian vegetation allowing enough time for maturation, especially in narrow valleys where the floodplain width is constrained. The ultimate system stability comes from the interaction of floodplain vegetation and accumulations of large wood. Bank protection may also be used in circumstances where the introduction of excessive amounts of fine sediment into a stream channel is having deleterious effects on aquatic habitat. In these systems it is critical to identify the cause of erosion. If streambanks are oversteepened due to channel incision, then armoring the banks will only be holding the stream in an unstable condition. For this situation, excavation of a floodplain in conjunction with bank protection may be necessary. Again, bank protection would comprise only a part of the overall restoration plan. Removing artificial armoring, such as riprap or concrete, and replacing it (if necessary) with large wood and vegetation, is a more direct restoration technique that should be seriously evaluated for streams that are currently armored.

Habitat restoration components can be integrated into bank protection projects by including woody

debris or other structure to create scour, deposition, shade, cover, and complex hydraulics, and by using appropriate native plant materials to restore native riparian plant communities as components of biotechnical bank protection; however, in this context, the project would generally still be identified as bank stabilization rather than restoration.

1.1.2 Physical and Biological Effects of Restoration-Based Bank Protection

Bank protection projects which seek to provide or improve natural bank stability generally have the most restoration benefits. In a restoration context, armoring or reinforcing of a bank with either wood or rock should be a short-term approach to stabilization. Long term bank stability should be self-sustaining, working with the natural tendencies of the stream system. The mode of streambank failure (i.e. saturation, undercutting, slope instability) will determine the type of stabilizing activity required. This will generally always include vegetation, but other structural components may be required as well. Refer to the ISPG for specific techniques.

Potential benefits of restoration-based bank protection include:

- Providing scour – large wood, boulders, and bank protection structures with natural analogs that create scour and thus provide cover.
- Providing cover – large wood, logs, boulders, and live plants.
- Providing a long-term source of all sizes of large wood by reestablishing native riparian forests or other appropriate native riparian plant communities.
- Providing an opportunity for evolving habitats
- Reducing fine sediment supply if it has been specifically identified as a limiting factor.
- Removal of existing artificial bank protection, such as riprap or concrete, and replacement with natural materials to allow for riparian and floodplain restoration.
- May restore natural rate of sediment recruitment.
- May increase wood supply (riparian management and revegetation).
- Increases shade and microclimatic effects.
- May allow natural channel migration processes to occur over time.

1.1.3 Application of Technique

- Refer to ISPG

1.2 Scale

- Refer to ISPG

1.3 Risk and Uncertainty

- Refer to ISPG

1.4 Data Collection and Assessment

- Refer to ISPG

1.5 Methods and Design

- Refer to ISPG

1.6 Project Implementation

1.6.1 Permitting

- Refer to ISPG

1.6.2 Construction

- Refer to ISPG

1.6.3 Cost Estimation

- Refer to ISPG

1.6.4 Monitoring and Tracking

- Refer to ISPG

1.6.5 Contracting Considerations

- Refer to ISPG

1.7 Operations and Maintenance

- Refer to ISPG

1.8 Examples

- Refer to ISPG

1.9 References

- Refer to ISPG

1.10 Photo and Drawing File Names